

What is claimed is:

1. An ultra-wideband information transmission for communication between a transmitter and a receiver, the method comprising

5 - a first encoding step on the part of the transmitter, in which a pulse group which is formed from a predetermined number of individual pulses in such a way that the individual pulses partially overlap in respect of time after the pulse forming operation is encoded in dependence on values of a random number sequence, and

10 - a correlation step on the part of the transmitter in which correlation of a reception signal with a signal pattern is effected,

wherein the signal pattern corresponds to the whole pulse group to be expected when using the same values of the random number sequence.

2. An ultra-wideband information transmission method as set forth in claim 1, further comprising a second encoding step on the part of the transmitter prior to, during or after the first encoding step, in which at least one bit value to be transmitted as information in the pulse group is encoded in accordance with a predetermined encoding rule.

3. A ultra-wideband information transmission method as set forth in claim 2, wherein to ascertain the transmitted bit value in the correlation step a correlation of the reception signal with a first and with a second signal pattern to be expected is effected, wherein the first and second signal patterns are encoded with the same values of the random number sequence and the first signal pattern corresponds to a pulse group which is encoded in the second encoding step with a first bit value and the second signal pattern corresponds to a pulse group which is encoded in the second encoding step with a second complimentary bit value.

20 4. An ultra-wideband information transmission method as set forth in claim 3, wherein the correlation of the reception signal with the first and the second signal patterns is effected in parallel.

25 5. An ultra-wideband information transmission method as set forth in claim 1, wherein in the first encoding step the individual pulses are phase-

modulated in dependence on the respectively current value of the random number sequence.

6. An ultra-wideband information transmission method as set forth in claim 1, wherein the transmitter additionally effects modulation of the spacing in respect of time of mutually successive pulse groups (first spacing modulation).

7. An ultra-wideband information transmission method set forth in claim 6, wherein the first spacing modulation operation is effected in such a way that the spectral energy distribution of signals emanating from the transmitter does not exceed predetermined limit values.

10 8. An ultra-wideband information transmission method as set forth in claim 2, wherein the first spacing modulation operation is effected in dependence on the random number sequence.

15 9. An ultra-wideband information transmission method as set forth in claim 1, wherein the transmitter and the receiver select the same random sequence from a number of random number sequences and the first encoding step is used at the same time for channel encoding.

20 10. An ultra-wideband information transmission method as set forth in claim 1, wherein the transmitter effects modulation of the spacing in respect of time of the individual pulses of the pulse group from each other in dependence on values of the random number sequence (second spacing modulation).

11. An ultra-wideband information transmission method as set forth in claim 1, wherein the transmitter and the receiver effect synchronization of the random number sequence prior to the commencement of information transmission.

25 12. An ultra-wideband information transmission method as set forth in claim 1, wherein the transmitter transmits to the receiver a training sequence of pulse groups, that is known to the receiver.

13. An ultra-wideband information transmission method as set forth in claim 1, wherein the predetermined rule for encoding of a bit value provides for

inverting or non-inverting all individual pulses of a pulse group depending on the respective bit value.

14. An ultra-wideband information transmission method as set forth in claim 1, wherein two bit values in a pulse group are transmitted, wherein a first bit value is encoded in a first predetermined number of individual pulses and a second bit value is encoded in the remaining number of individual pulses.

15. An ultra-wideband information transmission method as set forth in claim 14, wherein to ascertain the transmitted bit values on the part of the receiver in the correlation step, correlation of the reception signal with four signal patterns to be expected is effected.

16. An ultra-wideband information transmission method as set forth in claim 1, wherein a current value of a parameter which is dependent on the instantaneous transmission conditions is ascertained and the number of individual pulses of the pulse group is determined in dependence on the current value.

17. An ultra-wideband transmitting apparatus having a pulse group generator comprising

- a pulse generator which is adapted to deliver individual pulses at a predetermined time spacing from each other,

20 - a code generator which is adapted to deliver random signals dependent on the values of a random number sequence,

- an encoding unit which is adapted to encode an individual pulse delivered or to be delivered by the pulse generator in dependence on the current random signal, and

25 - a control unit which is connected to the pulse generator and which is adapted to actuate the pulse generator at predetermined moments in time for the delivery of a pulse group with a predetermined number of encoded individual pulses at predetermined time spacings from each other.

18. An ultra-wideband transmitting apparatus as set forth in claim 17, wherein the control unit is adapted to actuate the pulse generator to effect modulation of the spacing in respect of time of successive pulse groups.

19. An ultra-wideband transmitting apparatus as set forth in claim 18, wherein the control unit controls the first spacing modulation in such a way that the spectral energy distribution of signals emanating from the transmitter does not exceed predetermined limit values.

5 20. An ultra-wideband transmitting apparatus as set forth in claim 18, wherein the first spacing modulation is effected in dependence on the random number sequence.

10 21. An ultra-wideband transmitting apparatus as set forth in claim 17, wherein the control unit is adapted to select the random number sequence whose values form the basis for the outputted random signals of the code generator.

22. An ultra-wideband transmitting apparatus as set forth in claim 17, wherein the control unit is adapted to actuate the pulse generator for modulation of the time spacing of the individual pulses of the signal pulse group from each other in dependence on values of the random number sequence.

15 23. An ultra-wideband receiving apparatus having a pulse group generator comprising

20 - a pulse generator which is adapted to deliver individual pulses at a predetermined time spacing from each other,

- a code generator which is adapted to deliver random signals dependent on the values of a random number sequence,

- a first encoding unit which is adapted to encode an individual pulse delivered or to be delivered by the pulse generator in dependence on the current random signal, and

25 - a control unit which is connected to the pulse generator and which is adapted to actuate the pulse generator at predetermined moments in time for the delivery of at least one signal pattern in the form of a pulse group with a predetermined number of encoded individual pulses at predetermined time spacings from each other, and with a correlation unit which is connected to the pulse group generator and adapted to deliver an output signal dependent on the correlation of a reception signal with the signal pattern.

24. An ultra-wideband receiving apparatus as set forth in claim 23, wherein the correlation unit has a temporary memory for the signal pattern.

25. An ultra-wideband receiving apparatus as set forth in claim 23, wherein the pulse group generator has a filter device which is adapted to modify
5 the pulse group in accordance with a predetermined filter characteristic.

26. An ultra-wideband receiving apparatus as set forth in claim 23, wherein the pulse group generator has a second encoding unit which is adapted to encode at least one bit value in the pulse group in accordance with a predetermined encoding rule.

10 27. An ultra-wideband receiving apparatus as set forth in claim 23, wherein the second encoding unit is adapted to additionally encode in a copy of the pulse group the complementary bit value corresponding to the predetermined encoding rule and in which the pulse group generator outputs a first and a second signal pattern with complementary bit values.

15 28. An ultra-wideband receiving apparatus as set forth in claim 23, wherein the correlation unit has two correlators of which a first ascertains a correlation of the reception signal with the first signal pattern and the second ascertains a correlation of the reception signal with the second signal pattern.

20 29. An ultra-wideband transmitting-receiving apparatus comprising an ultra-wideband transmitting apparatus as set forth in claim 17, and an ultra-wideband receiving apparatus having a pulse group generator comprising

- a pulse generator which is adapted to deliver individual pulses at a predeterminable time spacing from each other,

25 - a code generator which is adapted to deliver random signals dependent on the values of a random number sequence,

- a first encoding unit which is adapted to encode an individual pulse delivered or to be delivered by the pulse generator in dependence on the current random signal, and

30 - a control unit which is connected to the pulse generator and which is adapted to actuate the pulse generator at predeterminable moments in time for

the delivery of at least one signal pattern in the form of a pulse group with a predetermined number of encoded individual pulses at predetermined time spacings from each other, and with a correlation unit which is connected to the pulse group generator and adapted to deliver an output signal dependent on the correlation of a reception signal with the signal pattern.

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